INVENTION: Decisioning rules for turbo and convolutional decoding

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ABSTRACT

The present invention describes new and improved a-posteriori decoding probabilities, decisioning metrics, and implementation algorithms for convolutional and turbo decoding. Convolutional decoding algorithms for forward and reverse decoding use a maximum likelihood ML algorithm in a trellis architecture that determines a path metric based on decision metric measurements to find the best trellis path. This ML algorithm can be modified to a maximum a-posteriori MAP iterative algorithm for turbo decoding. Turbo decoding algorithms use the MAP path metrics based on decision metric measurements and a-priori probabilities over the observed data set in the form of a likelihood ratio, to implement iterative decoding. This invention replaces the probabilities and decisioning metrics currently used in the ML and MAP algorithms, with new and improved a-posteriori probabilities and decisioning metrics that reduce the number of arithmetic multiply operations and thereby reduce the computational complexity, improve decisioning performance, improve iterative convergence thereby reducing compexity, improve bit error rate BER performance, and provide a new mathematical decoding paradigme. Complexity, iterations required for convergence, and BER tend to be key performance parameters of interest for most applications.

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